STUDIES UPON INJURIES OF THE KIDNEY, NEPHROLITHOTOMY AND NEPHRORRAPHY.

[CONTINUED[1]]

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NEPHROLITHOTOMY.

PERHAPS the most debated question relative to the operative attack upon the kidney, is the choice of the incision to be employed for its exposure.

Simple as it may seem, the convenient exposure of the kidney is nevertheless even under favorable conditions very often far from being an easy matter, and, where there is an accumulation of fat, a thickening of the abdominal wall, or where the circumrenal fat is present in large quantities and the kidney itself firmly bound down through a short pedicle, it is sometimes an extremely difficult matter to secure sufficient room for a thorough manipulation.

Quite a number of incisions have been recommended as furnishing accessible means of reaching the kidney.

Apart from the usual incision in the median line, either above or below the umbilicus, Langenbuch has recommended one in the linea semilunaris, which would be practically over the anterior surface of the organ.

Mr. Tait[2] is of the opinion that it matters very little, as regards the immediate success of the operation, whether it is attacked through the lumbar or the abdominal route.

Although he strongly favors the abdominal incision, should a nephrectomy become necessary, on account of the facility it affords for the examination of the opposite organ before proceeding to its removal, but for simple nephrotomy, the lumbar incision is preferable.

Kocher usually commences the incision immediately below the ensiform cartilage. König has practiced an L-shaped incision, commencing at the last rib and running parallel with the erector spinæ muscle to within a few centimeters of the os ilium. The incision then curves around anteriorly in the direction of the navel, ending about the external border of the rectus muscle, and if necessary even through this to the umbilicus. If the space is still insufficient, more room can be obtained by separating the peritoneum with the hand.

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[1] Continued from February.

[2] Lawson Tait, Birmingham, Med. Rev., Sept., 1885.

Newman favors the incision employed in Amussat's operation, which he outlines by drawing a line from the center of the iliac crest to the free extremity of the last rib.

This line is intersected by another drawn through its center, commencing at the outer border of the erector spinæ forward for a distance of three, or three and a half inches. The wound is then carefully separated by the aid of two flat retractors. Mr. Morris leans towards the lumbar incision in nephrotomy, while in nephrolithotomy he prefers an incision made four and a half inches in length, parallel with and three-quarters of an inch below the last rib. The structures divided being the same as in nephrotomy.

Mr. Knowsley Thornton has recommended a combination of both lumbar and abdominal incisions, under the name of the lumbo-abdominal nephrolithotomy, in which he employs the abdominal incision primarily for the purposes of exploration and diagnosis while secondarily a small lumbar incision is reserved for the extraction of the calculus.

After seeing the variety of incisions offered for the exposure of this organ, it goes without saying that the operative mind is yet far from being in concord upon this individual question, and, after all, the choice of the incision must finally be determined by the condition which prompts the interference and shapes the operation. In short, there are but two principal incisions, the others being but modifications of these. The abdominal incision, which may either be performed in the linea alba, or the linea semilunaris, and the lumbar incision, or a modification of this.

The comparative merits of these two methods may conveniently be summed up in the succeeding lines.

The principal advantages urged in behalf of the abdominal route, are:

First, the ease which it affords for determining the existence and condition of a second kidney.

Secondly, in the instance of large tumors, or where for some reason there is danger of considerable hemorrhage, the abdominal incision is more preferable by reason of the easy access and the extended space it offers for manipulation.

Thirdly, Mr. Newman, in speaking of Langenbuch's incision, remarks, "That the kidney is not only easily reached, but the large veins in the anterior layer of the meso-colon are avoided. Besides this it offers an excellent drainage, and is practically an extra peritoneal operation."

Touching upon the latter incision in nephrolithotomy, Mr. Thornton[1] recapitulates its advantages upon this point as follows:

"We are certain that the patient has the usual allowance of kidneys. The chances of overlooking the stone, if there is one present in either kidney, are reduced to a minimum. I do not say that the abdominal handling is absolutely infallible, but in fourteen operations I have only once failed to find a stone, and the recovery and present health of this one patient, as already given in her own words, make it highly improbable that there was, or is, a stone in her kidney. This result compares very favorably with a large number of unsuccessful lumbar explorations already recorded. Greig Smith mentions twenty-five cases of unsuccessful lumbar explorations, *i. e.*, no stone could be found. There is no fear of cutting into the healthy kidney while the stone is in the opposite one—a serious accident which my cases demonstrate as liable to happen at any time by the lumbar method.

"There is no fear of accidental wound of either colon or peritoneum, because they are guarded by the hand in the peritoneum, while the kidney and stone are fixed, so that a small, clean cut upon the stone is all the damage inflicted upon the loin tissues. There is, consequently, infinitely less risk of extravasation of urine or of after-suppuration, and no risk of a loin hernia. There is the great advantage of ascertaining what is the condition of the other kidney and that of both ureters."

Continuing, this surgeon remarks: "What are the objections to be set against these advantages?

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[1] Surg. of the Kidneys, J. K. Thornton, p. 36.

"Simply the making of two cuts instead of one. The increased risk, due to the opening of the peritoneum, is practically nil, *i. e.*, if the surgeon will take the pains to perform a thoroughly aseptic operation. I quite admit that this is the key of the position. If there is to be risk of septic infection of the peritoneum, then the combined operation is not justifiable; but I maintain that with proper care the mere opening of the peritoneal cavity and the manipulations in it necessary to examine the state of the kidneys and ureters, and to aid the execution of the lumbar extraction, are practically free from risk—certainly as free from risk as a large wound made through the loin tissues by a surgeon who is not cleanly enough in his work to avoid danger of infecting the peritoneum."

Quoting the opinions of other operators this author adds: "Morris says: 'But should we, under these circumstances, be ever justified in examining both kidneys from within the abdomen, I think we should, if the patient be clearly going into a bad way, more especially if there have been at any time marked crystalline forms in the urine, and if a digital examination of the vesical ends of the ureters gives a negative result.'

"In 1887, Bruce Clarke mentioned, at the Clinical Society, a case in which, with the lumbar incision, an hour elapsed before even the kidney could be found, and he adds: 'It would have been wiser to perform an abdominal operation.' The patient died."

In his speech at Leeds, he gives details of a most interesting case, in which a failure, by simple lumbar nephrotomy, was changed into complete success, by the aid of a hand in the peritoneum.

Yet, in the same debate, Morris spoke of the absence of any difficulty in finding the kidney by lumbar incision, and of the freedom from fatality and misfortune in this procedure. I know of at least one other case which has happened since, at one of the large London hospitals, in which the surgeon failed entirely to find the kidney by lumbar incision.

Morris also said, "What was wanted was greater precision in diagnosis." Precisely, and this is what my combined method gives.

Howard Marsh, in speaking on another occasion at the Royal Medico-Chirurgical Society, said: "One point in renal surgery seemed to be coming to the front—that many stones could not be reached from the loin. Our progress seemed to be in the direction of admitting the wisdom of abdominal exploration."

Time and experience tend liberally to the importance of arriving at an early diagnosis and instituting prompt interference.

Procrastination in this means untold suffering for the individual and the steady increase of the dangers militating against the ultimate success of the operation.

The force of such a statement can only be realized after a survey of Mr. Newman's tables, in which the mortality of abdominal nephro-lithotomies for suppurative disease amounted to 83 per cent. and that of the lumbar at 39.6 per cent. Against this is placed forty-two cases operated upon without suppuration with not a single death. These tables go further, in that they demonstrate the importance of the lumbar method where a suppurative process has already been established which is calculated to contribute to the infection of the peritoneum in the event of an abdominal operation.

While upon the subject of nephrectomy Thornton sums up the objections raised against the lumbar method, which, on the whole, bear a like relation as regards nephrolithotomy.

"1. The small space available for incision in most cases.

"2. The danger of wounding a pleura with a low insertion.

"3. The danger of wounding the colon or the peritoneum, and of fouling the latter, without being aware of the accident.

"4. The possibility of not being able to find the kidney at all, an accident which has happened in a large number of cases, and to experienced London surgeons.

"5. The possibility of removing a single kidney without knowing that the patient has only the one.

"6. The impossibility of noting the condition of the other kidney and ureter.

"7. The fact that it is only suitable for a limited number of cases, it being impossible to remove much-enlarged kidneys through any incision that can be confined to the loin.

"The great point advanced in its favor is that, up to the present time, it has been more successful than the abdominal method.

Why? Simply because it has been the fashionable method, and the abdominal method has usually been a last resource in cases which were too bad to be operated upon by the lumbar method.

" Even so. Newman's tables show that there were twenty-one deaths in fifty-four fatal lumbar nephrectomies from shock and collapse, against twenty in sixty-six fatal abdominal nephrectomies from the same causes. I do not suppose any rational being will, in the present day, make the mere opening of the peritoneal cavity a reason against abdominal section and in favor of lumbar. Newman is undoubtedly right when he says: "If the relative position of the two operations were reversed, the mortality of the lumbar operation would be much higher than that of the abdominal one now is."

From the remarks of Thornton, which have so clearly and logically set forth the advantages and disadvantages of these respective incisions, it remains as a natural conclusion that in the vast majority of cases the abdominal is by far the most justifiable and philosophical operation.

The exceptions to which the lumbar method is addressed, are those in which for some reason there are grounds for suspecting the danger of infection of the peritoneum and the resulting consequences.

The congenital absence of one kidney is very rare. Mr. Morris, after carefully searching the post-mortem records offers the following comparisons:

Of 4632 inspections made in the ten years ending in 1882, at Guy's Hospital, there occurred one congenital absence or undeveloped rudiment of one kidney.

Of 2610 inspections made at the Middlesex Hospital during the ten years ending in 1883, there was no case of congenital absence or undeveloped rudiment of one kidney.

Of 3800 inspections made at Bartholomew's during the ten years ending in 1884, there was no case of congenital absence or undeveloped rudiment of one kidney.

Of 936 inspections made at the Hospital for Children, Great Ormond, during the ten years ending in 1884, there was one case of congenital absence and one of extremely defective development.

These four sources make an aggregate total of 11,978 examinations with three cases of absence or of extreme atrophy of one kidney or of one in every 3992⅔ cases.

In addition, Mr. Morris repeats the estimates of Weir and Petersen, the former placing this abnormality at 1 in 5000 cases, and the latter in one in 1500, the combining figures being two in 6500 bodies, or one in 3250. Jacobson[1] and others have pointed out the importance of counting the ribs in performing the lumbar incision. The necessity of observing this precaution is best felt, when it is remembered that the dissections of Hall have shown that the pleural cavity in sixty cadavers descended as low as the first lumbar vertebra, or where the last rib is wanting it descends as low as the ligamentous band that supplies its place.

Prof. Dumreicher accidentally opened a pleural cavity with a lethal result, in an attempt to remove a pyelo-nephrotic calculous kidney. At the post-mortem the last rib was found rudimentary, and the pleura projecting a considerable distance below the lower edge of the eleventh rib.

Lange,[2] who has made rather extended study upon this anatomical point, has demonstrated that the pleura reaches even lower along the spine.

The question of hemorrhage is another that has ever occupied the surgeon's mind in all operative attacks upon the kidney.

While the statement that the hemorrhage from this source is easily controlled through the use of gauze, is inclined to produce an impression underestimating the difficulty of the same, a study of a number of injected kidneys has firmly convinced the author that at least in a number of kidneys it would have been impossible to have made an incision of scarcely any depth without creating a hemorrhage far too great to be conveniently controlled by this measure.

The hemorrhage which occurred in many of the experiments has suggested the importance of a means which would provide a bloodless, or almost bloodless, operation. In the attempt to

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[1] W. H. A. Jacobson.—Symptoms and Conditions which Justify Nephrolithotomy. *Br. Med. Jour.*, Jan. 14, 1890.

[2] Observations upon the Surgical Anatomy of the Kidneys with special reference to the twelfth rib, the Pleura, the Diaphragm, etc. Frederic Lange, Annals of Surgery, October, 1885.

devise means for securing this end a variety of measures were tried, partly with the view of estimating their respective merits in securing a bloodless field, as well as determining their individual effect upon the coats of the renal artery. While a number of instruments affording different characters and degrees of compressions were employed, it was only in one instance in which there remained any ground for suspecting that an injury had been inflicted upon the arterial coats. In this a hard, wooden clamp was employed, with its blades very tightly applied by an assistant, who possessed an unusual degree of strength. Finally, a clamp was devised, armed at the extremity of its blades with two transverse segments, one of which was concave and the other convex. These were each covered with soft rubber tubing to moderate their effect upon the arterial coats.

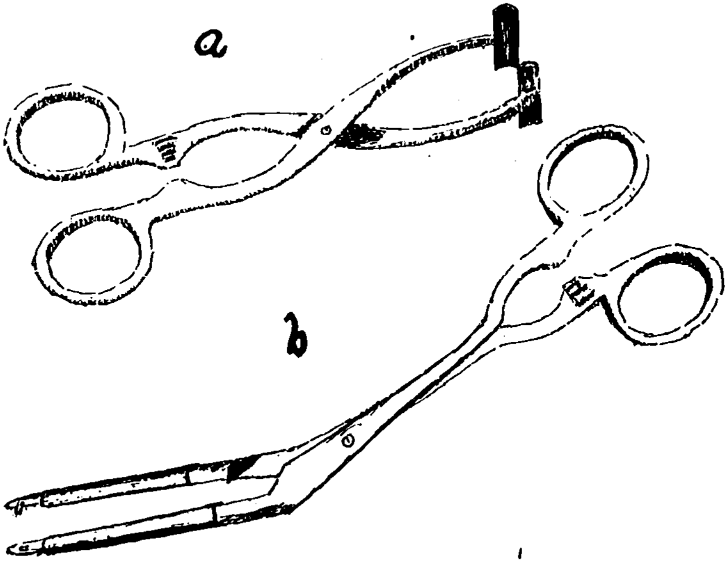

FIG. 7.—*a*, Imperfect clamp. *b*, Modified clamp for compressing renal artery.

Experience demonstrates the difficulty of securing, as well as retaining the renal artery. The groove was frequently too small for the artery, or the relation of the latter to the vein was such that almost as much of the vein was compressed as the artery, increasing rather than diminishing the hemorrhage. In lieu of this a modification of the latter, which included the whole renal root, was tried. In applying these forceps the ureter may, or may not, be included within the compression. When applied a distance of a few centimeters from the internal border the blades passed clear of this duct, since it describes a short curve in a downward direction soon after leaving the kidney. The instrument in question is fashioned after an ordinary forcep. The blades are rounded, one of which is armed upon the inner side of its extremity with a small blunt spine, while the opposite one is perforated for the reception of this small projection; the function of the same being to guard against the possibility of the forceps slipping away.

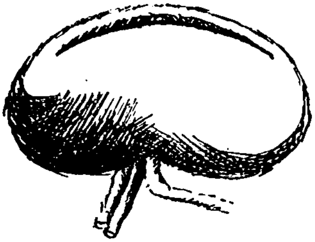

FIG. 8.—Exploratory incision upon the external border.

When in use, the tissues are protected from any possible violence by carefully covering the blades with soft rubber tubing. The pressure can be regulated by means of three small cogs arranged near the handles.

During the compression of the renal artery there is not only a cessation of the hemorrhage, but the secretion of urine also becomes arrested.

According to Littre and Robart a ligature of the renal artery for two or more hours causes a necrosis of the epithelial lining of the contorted tubes and glomeruli. The time, however, required for the longest operation is not sufficiently lengthy to practically effect the kidney when rendered anæmic for such a purpose.

After the kidney has been subjected to a thorough examination by means of careful palpation and thorough exploratory punctures with the needle, with a negative result as to the location of the calculus, its interior can then be exposed through an incision for a closer inspection. Should, however, a stone be located an incision performed over its greatest prominence is to be selected. Where no such a guide is at hand there are a variety of incisions that may be employed. The organ may be laid open through one made in the external border, or through one made in its transverse axis, or through one into the kidney proper just above the pelvis, or, lastly, through the pelvis itself.

As for the choice of these a great deal will depend upon the attending circumstances. An incision through the kidney structure, whenever practicable, is always preferable to one made through the pelvis itself, since the kidney structure not only heals more kindly than the pelvis, but, in view of its thickness, it is less liable to be complicated with resulting fistulous tracks. As for the respective merits of the other incisions, the transverse is, perhaps, the least desirable should a deep incision become necessary, since it affords but a limited access to the interior of the organ, unless it is carried to such an extent that would seriously jeopardize the safety of the organ. The selection of the incision, in the absence of a direct guide obtained either through palpation or an exploratory puncture, is between one in the external border and one made just above the pelvis.

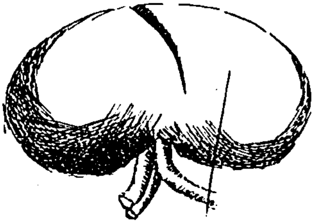

FIG. 9.—Exploratory incision through the transverse axis of the kidney.

The practical difference between these two incisions is that the one above the pelvis necessitates the division of less renal structure, and while it is a closer route to the pelvis it is nevertheless questionable whether it affords the most thorough exploration of the same. Because of its transverse nature it not only exposes but severs the calyces and all the vessels of one side for the length and depth of the incision.

Although the incision performed upon the external border is through a much deeper layer of renal tissue, it affords not only a thorough exploration of the entire pelvis, but is also a favorable one for closure and repair. Its course being rather in the direction of the vessels and calyces, it allows an examination of the latter with as little as possible injury to the same.

The respective merits of these two incisions can only be determined after having been subjected to a more extended application.

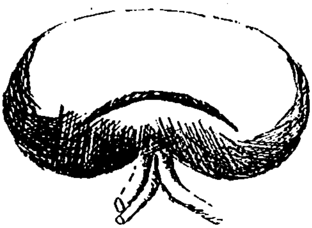

FIG. 10.—Exposure of the pelvis through a semi-lunar incision.

Before the closure of the incision is undertaken, the kidney should be carefully freed of all clots that may have accumulated from the contained blood, the cavities thoroughly irrigated, and, unless otherwise indicated, securely closed by deep and superficial sutures, as already indicated under injuries.

If there is any available structure surrounding the kidney this can be carefully drawn over the same to reinforce the closure.

If an incision into the pelvis be undertaken it should be closed by the Czerny or double suture to more thoroughly guard against the occurrence of a fistulous track.

These are but additional remarks which are not intended to replace a more extended analysis of the details of this important subject.

EXPERIMENTAL OPERATIONS UPON NEPHROLITHOTOMY.

EXPERIMENT 27. Oct. 21. Large size dog. Weight 24 kilograms. Left kidney exposed and the pelvis laid open by a semi-lunar incision made at one-third distance from internal border. This incision allowed a thorough exploration of the entire pelvis and the commencement of the ureter. The wound was closed by means of deep interrupted sutures of catgut that were immersed in tincture chloride of iron. The superficial edges were approximated by means of interrupted silk stitches. This afforded a perfect apposition. The surface was then covered with an apron of omentum. The whole organ was thoroughly irrigated with warm, sterilized water and replaced.

Given 4 Cc. of Magendie's Sol. and removed. Reaction followed promptly.

Oct. 22. Takes food.

Oct. 23. Appears lively.

EXPERIMENT 28. Dec. 2. The same dog used in previous experiment served for the present. The animal had entirely recovered and was ready for a second operation. The opposite kidney was exposed and its pelvis opened by an incision across the short axis of the organ. The lateral edges of the incision being more superficial than its central portions which extended down into its pelvis. This incision rendered the commencement of the ureter visible and allowed a complete exploration of the entire pelvis of the kidney. This operation was far more bloody than the preceding. The surfaces were apposed by deep sutures of catgut that had been immersed in tincture of iron. The superficial edges were brought together by interrupted silk sutures. The organ was irrigated with sterilized water and returned.

Given 4 Cc. of Magendie's Sol. and removed.

Dec. 3. Refuses food. Appears very thirsty.

Dec. 4. Same.

Dec. 5. Appetite improved. Thirst diminished.

Dec. 23. The animal met with an accident which resulted in its death.

P. M. The kidney upon which the lateral incision was practiced was found firmly united. Upon section a yellowish cicatricial tissue which represented the bond of union, was exposed. Upon exposure of its interior a few flakes of yellowish purulent matter were found. The kidney upon which transverse section was practised was found not as firmly united. The edges partly gaping. No adhesions upon this kidney.

EXPERIMENT 29. Nov. 3. Small size dog. Weight 8.5 kilograms. Kidney exposed and laid open with a bold incision through the short axis of the organ reaching to its pelvis.

This afforded a thorough examination of the pelvis and ureter. The kidney was closed by three deep sutures of ferrated catgut. The edges of the incision were approximated with interrupted silk sutures. This afforded perfect apposition with but a small amount of hemorrhage. The operation was made practically bloodless by a digital compression of the renal artery. The animal soon rallied.

Nov. 4. Walks about, but refuses food.

Nov. 5. Appetite improved.

Nov. 6. Eats well. Appears lively.

Nov. 7. Refuses food.

Nov. 8. Found dead.

P. M. Cavity clean; no adhesions. The divided edges rounded, patulous and in a sloughing condition. Catgut remained unchanged.

EXPERIMENT 30. Nov. 3. Large size dog. Weight 23 kilograms. Kidney exposed and compressed by means of a digital compression. The pelvis was laid open by an incision made into its external border extending from one to the other extremity. This afforded an excellent view of the interior of the organ. The kidney was brought together by means of six deep interrupted sutures assisted by superficial silk stitches.

Given 4 Cc. of Magendie's Sol. and removed.

Nov. 4. Walks about. Appetite good and appears lively.

Nov. 5. Same.

Nov. 6. Appetite diminished and seems to be losing ground.

Nov. 7. Diarrhœa. Mucoid stools streaked with blood.

Nov. 8. Gradually wasting. Appetite diminished.

Nov. 9. Same.

Nov. 10. Condition unchanged.

Nov. 11. Appetite better.

Nov. 12. Diarrhœa diminished and appetite improving.

Nov. 13. Improving.

Dec. 29. Appears lively. Diarrhœa has ceased for more than three weeks. Gained apparently some in weight.

Killed.

P. M. The incised kidney contracted to almost half its original size. The line of union firm. Omental adhesions throughout the entire incision.

EXPERIMENT 31. Nov. 17. Medium size dog. Weight 18.5 kilograms. Kidney exposed and rendered bloodless by digital compression. Pelvis and ureter laid bare by an incision through the short axis of the organ. Central portion of the incision being deeper than the lateral. After thorough exploration of the pelvis the wound was closed by deep interrupted sutures of ferrated catgut and the superficial edges by means of silk stitches.

Given 4 Cc. of Magendie's Sol. and removed.

Nov. 18. Appetite good. Appears lively.

Nov. 19. Same.

Dec. 18. The dog made an uninterrupted recovery.

Reclaimed.

EXPERIMENT 32. Nov. 20. Small size dog. Weight 13 kilograms, Kidney exposed and rendered bloodless by digital compression. Pelvis laid bare by transverse incision, as in the preceding experiment. The incision was closed by deep interrupted sutures introduced near the extremities of the organ and the edges brought together by a second row of superficial stitches.

Given 4 Cc. of Magendie's Sol. and removed.

Nov. 21. Takes food and water, but appears quite weak.

Nov. 22. Improved.

Nov. 23. Good appetite. Appears active.

Jan. 3. Recovered. Killed to obtain the specimen.

P. M. Kidney slightly contracted. Omentum adherent.

EXPERIMENT 33. Nov. 20. Medium size dog. Weight, 14 kilograms. Kidney exposed and rendered bloodless by digital compression. The pelvis and ureter were laid bare by an incision into the long axis to the extent of one-half the length of the organ. The incision was closed by four deep sutures passed around almost the entire organ. The superficial edges were brought together by interrupted silk sutures. Given 4 Cc. of Magendie's Sol. and removed.

Nov. 21. No food. Quite thirsty and very weak.

Nov. 22. Slightly improved.

Nov. 23. Takes a small quantity of finely-chopped meat.

Nov. 24. Appetite better, but still weak.

Dec. 11. Eats well and appears hearty. Disappeared.

EXPERIMENT 34. Nov. 23. Medium size dog. Weight, 15.5 kilograms. Kidney exposed and pelvis laid bare by a semilunar incision made one-third above its internal border. This operation was rendered bloodless through the application of a wooden clamp applied to the artery. Before closure of the incision the pelvis was carefully irrigated and freed from all remaining blood clots. The incision was closed by means of deep interrupted and superficial silk sutures. Given 4 Cc. of Magendie's Sol. and removed.

Nov. 24. Refuses food. Takes a few ounces of water.

Nov. 25. Took a few pieces of meat.

Nov. 26. Looks dull, appears weak, slight appetite.

Nov. 27. Quite weak. Takes a small quantity of meat. Very thirsty.

Jan. 10. Killed for further examination.

P. M. Firm union. Slightly contracted as compared with the opposite kidney.' Omentum adherent.

EXPERIMENT 35. Nov. 23. Large size dog. Weight 26.5 kilograms. Kidney exposed and the pelvis laid bare by a semi-lunar incision into its side. The incision was made about half way between the internal and external borders. The operation was only partially bloodless, owing to imperfect digital compression. After irrigation of the pelvis and the removal of most clots, the incision was closed by the use of deep and superficial interrupted silk sutures. Given 4 Cc. of Magendie's Sol. and removed.

Nov. 24. Eats raw meat and drinks a large quantity of water which he soon vomits.

Nov. 25. Refuses food.

Nov. 26. Very thirsty. Takes but a small quantity of meat.

Nov. 27. Very weak.

Nov. 28. Same.

Nov. 29. Found dead.

P. M. Abdominal cavity contained about 350 Cc. of clotted blood. No adhesions. Renal wound gaping and of a softened appearance. Death from secondary hemorrhage.

EXPERIMENT 36. Nov. 27. Large size dog. Weight 22 kilograms. Kidney exposed and rendered bloodless by compressing the renal artery with a hæmostatic forceps, the blades of which were protected by covering with a piece of rubber-sheeting. The pelvis was explored through asemi-lunar incision madeinto the side of the organ. The incision was closed with a series of deep interrupted and superficial stitches. Given 4 Cc.' of Magendie's Sol. and removed.

Nov. 28. Eats and drinks.

Nov. 29. Same.

Nov. 30. Improving.

Jan. 12. Sacrificed for further examination.

P. M. Incised surface firmly united and marked by an adhesion of the omentum, intestine and spleen. Upon section, the interior of the kidney partially destroyed. The deep sutures were visible and seemed slightly softened and enlarged.

EXPERIMENT 37. Nov. 27. Medium size dog. Weight 15.5 kilograms. Kidney exposed and rendered bloodless with a hæmostatic forceps as in the preceding experiment. An absolutely bloodless incision was made after the same fashion as in the preceding operation. The incision was closed by three deep interrupted silk sutures and a number of superficial stitches. Given 4 Cc. of Magendie's Sol. and removed.

Nov. 28. Takes a small quantity of raw meat.

Nov. 29. Same.

Nov. 30. Improved.

Nov. 31. Lively. Eats some raw meat. Continued thus in a very fair condition until Dec. 7, when he was exposed to cold.

Dec. 8. Refuses food and appears unwell.

Dec. 9. Found dead.

P. M: Adhesions upon the incised surface. The kidney somewhat disorganized and filled with a gelatinous pus. Death from nephritic abscess.

EXPERIMENT 38. Nov. 30. Small size dog. Weight 11.5 kilograms. Kidney exposed and pelvis explored through a lateral incision. The operation was made bloodless by compressing the renal artery with a specially prepared clamp. The wound was closed by a number of deep and superficial interrupted stitches. Given 4 Cc. of Magendie's Sol. and removed.

Nov. 31. Appetite fair.

Dec. 7. Eats hearty and appears comfortable.

Jan. 6. Apparently recovered. Good appetite, and appears lively. Sacrificed for further examination.

P. M. Kidney united. Omentum, spleen and intestines adherent.

EXPERIMENT 39. Nov. 30. Medium size dog. Weight 14.5 kilograms. Kidney exposed and pelvis explored through an incision similar to that in the preceding experiment. The operation was bloodless and completed in the same manner as in the foregoing. Given 4 Cc. of Magendie's Solution and removed.

Nov. 31. Refuses food.

Dec. 1. Took a small quantity of milk.

Dec. 2. Improved.

Dec. 3. Eats hearty and appears lively.

Jan. 6. Sacrificed for further examination.

P. M. Kidney firmly united, slightly depressed and apparently diminished in size. Omentum adherent.

EXPERIMENT 40. Nov. 19. Small size dog. Weight 4 kilograms. Kidney exposed and incised along its external border. This incision reached to a point about midway between the external border and edge of the pelvis. This was closed by a continuous silk suture. Good apposition and perfect hæmostasis was obtained. Given 2 Cc. of Magendie's Solution and removed.

Nov. 20. Up; appears lively; eats hearty, and is apparently unaffected by the operation.

Nov. 21. Same.

Dec. 26. Sacrificed for further examination.

P. M. Wound nicely united. Stitch visible beneath a layer of exudate.

NEPHRORRHAPHY.

Since the publication of nephrorrhaphy by Hahn in 1881, this operation, on the whole, has practically lost none of its original identity. The only effect which the last decade has occasioned in this direction has been the addition of different materials to be employed for its fixation, together with a few modifications which have added to the security of its attachment.

We must confess that it still remains for the future to offer measures which insure more certainty in these cases. The important questions in this connection which divide the surgical mind are the selection of the most desirable suture material and the decision as to the attachment which offers the greatest permanency in reattaching the displaced kidney.

As for the first, a variety of material has been recommended, *e. g.*, silk, cat-gut, silk-worm gut, silver wire and kangaroo tendons. So far as the preference in the selection goes, that, as yet largely depends upon the individual opinion of the operator.

Many favor cat-gut alone. Some a number each of cat-gut and silk-sutures, while a very large per cent. select the silk which experience has amply proven to be innoxious, besides having the advantage of offering more permanency in its fixations.

Bearing upon the different methods of securing its attachment. Dr. McCosh[1] upon this same subject has represented the four available methods which have already been resorted to.

"1. The adipose capsule, opened or unopened, is united by sutures to the edges of the incision.

"2. After freely opening the adipose capsule, the sutures are passed through the fibrous or true capsule of the kidney.

"3. After the free exposure of the kidney, the sutures are passed directly through its parenchyma.

"4. A certain portion of the capsule proper is stripped off the kidney, and the sutures passing through its parenchyma bring the raw surface thus made directly in contact with the cut tissues of the loin. The sutures enter and emerge through the capsule just outside the raw margin and are then passed through the tissues on each side of the incision which is closely united."

Apart from the main outlines here represented, there is yet a vast amount of detail which different operators have variously recommended.

A number of experiments were performed with the hope of devising a method which would offer more certainty or perhaps take the place of nephrectomy in the more rebellious variety of these cases.

The sutures were replaced by natural stays, in the shape of a pocket, formed between the transversalis and internal oblique muscles. The attempt in the beginning was very unsuccessful, the cause of which was later found not to be dependent upon a muscular compression, but to a traction upon the root of the kidney, especially when the operation was performed upon the right side. It was noticed that in every instance the left kidney was always more or less movable as compared with the right, and where the latter was selected it was always followed with an early death, dependent upon a traction of its root. With the exception of one or two, the implantations upon the left side were all successful. In the excepted cases, the death was not dependent upon compression, but rather to the effects of sepsis consequent to an imperfect drainage.

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[1] The surgical treatment of movable kidney, A. J. McCosh, N. Y. Med. Jour., March 15th, 1890.

The experiments were mostly performed in the lumbar region, some however, were also performed through the abdominal route. In some the circumrenal structures were left undisturbed, the kidney being thus implanted in its new location, whereas in others all but the capsule were removed. In a few this was also stripped off, leaving the raw surface behind. On no occasion was the slightest evidence to be observed of any evil effect from the compression of the kidney.

When the kidney in its raw state was implanted, the whole organ became adherent, whilst if the circumrenal tissues were left, they alone became attached, whereas the kidney itself remained free within its surrounding structures.

The divided edges of the transversalis muscle were either brought in contact, or they were loosely sutured with the space of about one centimeter intervening.

In either event the edges finally united by a firm cicatrix.

In two of the experiments this principle was thoroughly tested as to its feasibility, at least in lower animals.

Soon after the kidney was successfully implanted the opposite one was removed in order to more fully determine the value of the implanted kidney.

In one, the animal was allowed to live about two and a half, while in the other, it lived about three and and a half months, during the whole of this time upon the single implanted kidney.

Throughout the whole of this period there were absolutely no signs to be noticed of any discomfort whatever; the animals appeared lively, gained in weight, and, in short, presented a first-class condition. Externally the outlines of the organ were scarcely discernible and manipulation gave rise to no discomfort to the animal.

After the animal was sacrificed, the kidney in each was found nonadherent, the circumrenal tissues alone being attached to the adjacent sides of the muscle.

The organs were further submitted to a microscopical examination, in which it was observed that the capillaries were somewhat enlarged, a slight fatty infiltration and a granular degeneration of the cortex, limited, however, to the peripheral cortex alone.

The deep tubes and epithelium were normal.

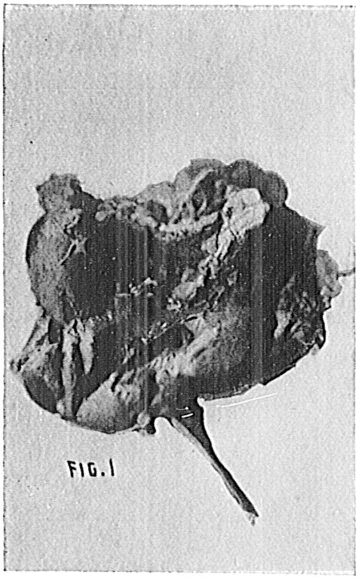

FIG.1

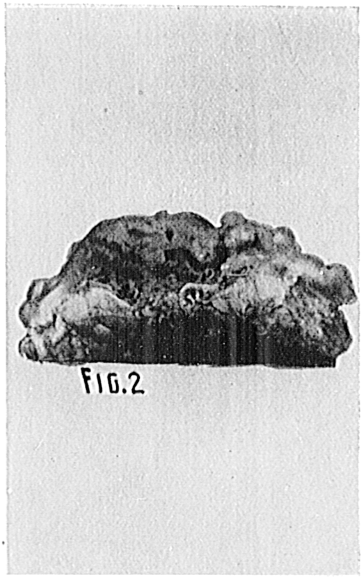

FIG.2

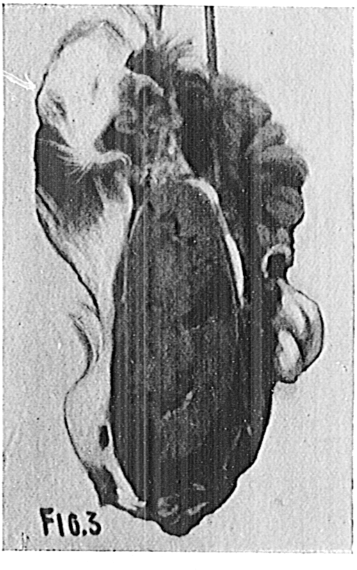

FIG.3

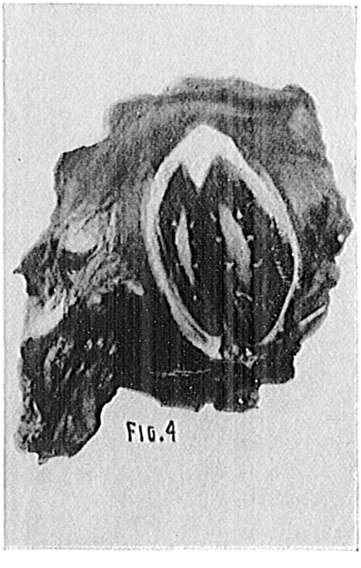

FIG.4

FIG. 1.—Destructive internal changes following an exploration.
FIG. 2.—Ulcerated exterior resulting from a peri-nephritic suppuration.
FIG. 3.—Frozen section of an implanted kidney.
FIG. 4.—Frozen section from within of an implanted kidney.

A number of studies were made upon cadavers, with the intention of utilizing this upon the human subject.

The space between the last rib and the iliac crest is hardly sufficient to admit of a safe implantation.

In a few sufficient room might be obtained for its implantation, yet the space is shortened by different positions of the body, which would seriously interfere with its safety. There is another region which would be perhaps better adapted for the reception of the organ than the abdominal wall.

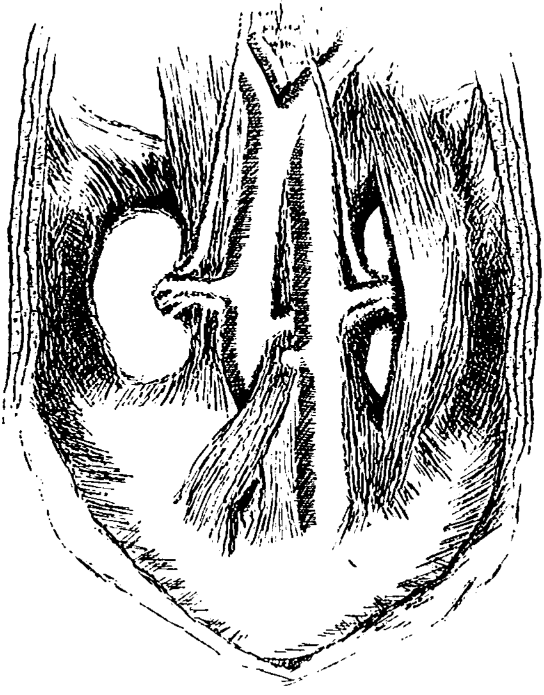

FIG. 11.—Showing the kidney implanted between the fibres of the psoas magnus muscle.

The psoas magnus muscle can be divided near its external edge, in such a manner as to afford a thin muscular lamella, which forms the outer wall of a pocket.

In a few the muscle was large enough to furnish a pocket of sufficient size to completely hold the organ, while in others this end was only partly accomplished. Where the pocket was large enough, the edges of the muscle were reunited over the inner border of the organ, leaving a suitable provision for its root, or where it was insufficient the edge of the muscle was united with the surface of the kidney itself. Should this upon further consideration assume a feasible aspect, it would only address itself to those cases where other methods had failed and this adopted as a *dernier resort* before recourse is had to nephrectomy.

Again, it could not be employed in every case, since this muscle in a number of cadavers was markedly insufficient to answer the purpose. It is also to be observed in dividing the muscle to cut clear of the vertebra, which insures a soft wall upon the inner side and a yielding one upon the outer side.

Besides this, care should be observed as to the depth of the incision, to avoid the lumbar plexus of nerves and lumbar arteries.

However Utopian this may seem in lower animals, we must be slow and careful in exercising boldness based upon experience gathered in this manner from the experimental field. The fact that many steps are feasible in lower animals that would be far from permissible in the human subject has not escaped the author's observation. And in offering this suggestion it is more with the hope that others more fitted than myself might enlarge upon whatever value it possessed, rather than the expectation of its feasibility or adoption in its present undeveloped state.

EXPERIMENTAL OPERATIONS UPON NEPHRORRAPHY.

EXPERIMENT 41. Aug. 10. Small size dog. Weight 4 kilograms. Median laparotomy. The kidney was drawn forward and freed of all the circumrenal structures. An incision of about 3 Cm. in length was made in the transversalis muscles parallel with its fibres.

A pocket was formed by dissecting the transversalis away from the oblique muscle by means of the finger-nail. The kidney was deposited into this pocket in such a manner that the long axis of the organ was at right angles with the fibres of the transverse muscle. The divided edges of the transversalis muscle were united by a continuous catgut suture and the abdomen closed.

Given 4 Cc. Magendie's Sol. and removed.

Seen few hours after the operation, the outlines of the kidney plainly visible externally and occasionally muscular twitching.

Aug. 11. Refuses food and seems unable to stand.

P. M. Died. Abdominal cavity contained 225 Cc. of bloody fluid. No adhesions. The parietes glazed with lymph.

Death from the effects of traction upon the root of the kidney.

EXPERIMENT 42. Aug. 12. Small size dog. Weight, 7 kilograms. The same operation as in the previous experiment was performed in this, differing only that in this the incision was made directly in the loin of place of the linea alba. The incision of each layer was made parallel with the long axis of the body, excepting the transversalis muscle, which was made in the direction of its fibres. The kidney was deposited in this pocket and the edges of the transversalis drawn within one Cm. of approximation. The other layers were each carefully closed over the implanted kidney.

Given 4 Cc. of morphia hypodermically and removed.

Aug. 13. Presents a somewhat dull appearance and refuses food. Unsteady walk.

Aug. 20. Eats and drinks heartily. Some of the stitches were torn out and the wound slightly gaping.

Aug. 28. Appears lively; eats and drinks. The wound entirely healed excepting the skin and second layer, which were still gaping.

Aug. 25. Wound almost united. Nephrectomy was practiced upon the other kidney, but the animal died from the chloroform just as the external wound from this was being closed.

P. M. The implanted kidney was found firmly imbedded and somewhat adherent. The edges of the transversalis were almost covered with omental adhesions.

EXPERIMENT 43. Aug. 18. Small size dog. Weight, 4 kilograms. Median laparotomy.

Both kidneys were carefully drawn into view and freed of all their circum-renal structures, including even the capsule of the organ. The kidneys presented a raw exterior and in this state they were replaced into the abdominal cavity. Cavity closed and given 2 Cc. of Magendie's Sol.

Aug. 19. Walks about, but refuses food.

Aug. 20. Lively; eats and drinks heartily.

Aug. 22. Appears well; eats and drinks heartily. The animal has assumed a very drawn up appearance.

Sept. 5. Same. Continues in the same deformed attitude. Killed for further examination. The kidneys were found movable and completely covered by adherent omentum.

EXPERIMENT 44. Sept. 13. Small size dog. Weight, 9 kilograms. The left kidney was exposed through a lumbar incision and with as little disturbance as possible to its surrounding structures implanted into a pocket formed between the transverse and internal oblique muscle; the overlying structures were carefully closed, layer after layer, by continuous sutures.

Given 4 Cc. of Magendie's Sol. and removed.

Sept. 14. Walks about and shows very little evidence of discomfort; drinks largely of water, but refuses food.

Sept. 15. Refuses food and water.

Sept. 16. Found dead.

P. M. The cavity contained 150 Cc. of purulent fluid, the kidney apparently unaffected by compression. Slight adhesions.

Death from sepsis.

EXPERIMENT 45. Sept. 13. Medium size dog. Weight 13 kilograms, Median incision, exposing the kidney. A pocket was formed by incising the transversalis at right angles to the course of its fibres. The kidney was implanted into this pocket and the transversalis carefully drawn over the edge of the organ to the extent of 1 Cm., and fixed there by continued silk suture introduced into the kidney structure. Slight hemorrhage from the renal stitches. The cavity was cleansed and closed. Given 4 Cc. of Magendie's Sol. and removed.

Sept. 14. Walks about. Takes water and milk.

Sept. 15. Same.

Sept. 16. Dead.

P. M. Cavity contained 200 Cc. of sero-purulent fluid. The line of union seemed perfect, but upon dissection two small abscesses were found communicating with the stitches. Slight adhesions. Death from sepsis.

EXPERIMENT 46. Sept. 30. Small size dog. Weight 4.6 kilograms. Medium laparotomy exposinp kidney. This was separated from its perirenial structures and anchored beneath a ribbon-like strip of the transversalis muscle. The greater omentum was likewise drawn beceath this muscular band and made to envelop the kidney. The omentum and the kidney were reinforced with a few silk stitches. Cavity sponged and closed. Given 4 Cc. of Magendie's Sol. and removed.

Oct. 1. Walks about; refuses food.

Oct. 2. Same.

Oct. 3. Dead.

P. M. Abdominal cavity contained 75 Cc. of thin, sanguineous fluid. The kidney firmly fixed and covered with adhesions. Death from traction.

Experiment 47. Oct. 7. Small size dog. Weight 6.5 kilograms. Kidney exposed and found to be very movable. This was implanted between the internal oblique and transversalis muscles. The perirenal structures were left undisturbed, and in closing the transversalis muscle were included in the stitch. The oblique muscles were each carefully closed by distinct rows of sutures, followed by the superficial structures. Given 4 Cc. of Magendie's Sol. and removed.

Oct. 8. Walks about with unsteady gait. Refuses food.

Oct. 9. Eats and drinks. Shows no sign of discomfort.

Oct. 10. Same.

Nov. 13. Anæsthetized preparatory to the removal of the unimplanted kidney. The anæsthetic, however, was pushed with a fatal effect.

P. M. The implanted kidney firmly imbedded and of a normal appearance.

Experiment 48. Oct. 9. Medium size dog. Weight 5.5 kilograms. Kidney exposed and implanted into the abdominal wall between the internal oblique and transversalis muscles. The perirenal structures were preserved and included in the stitch employed for the closure of the transversalis muscle. The kidney was steadied by single stitch introduced into its external border.

Given 4 Cc. of Magendie's Sol. and removed.

Oct. 10. Eats freely. Appears able to walk but a short distance. Passes bloody urine.

Oct. 11. Eats freely and appears hearty.

Oct. 12. Same.

Oct. 13. Refuses food, but drinks a large quantity of water.

Oct. 14. Found dead.

P. M. Cavity contained 55 Cm. of sanguino-purulent fluid; few adhesions. Cavity dotted here and there with flakes of yellowish-green curds. Kidney bathed in pus and somewhat softened. Death from sepsis, arising apparently from the lumbar wound.

Experiment 49. Oct. 24. Medium size dog. Weight 21 kilograms. Left kidney exposed and implanted into the abdominal wall between the oblique and transversalis muscles. The overlying layers were each closed by separate rows of sutures.

Given 4 Cc. of Magendie's Sol. and removed.

Oct. 25. Refuses food.

Oct. 26. Eats and drinks.

Oct. 27. Same.

Nov. 7. Lively. Takes food freely and apparently recovered.

Nov. 12. Nephrectomy was performed upon the opposite kidney. In its removal the ligature slipped and a furious hemorrhage ensued. The vessel was again found, but only after the original incision was very much enlarged.

Given 4 Cc. of Magendie's Sol. and removed.

Nov. 13. Very weak. Refuses food.

Nov. 14. Improved.

Nov. 15. Eats heartily.

Jan. 26. Dog lively. Has gained in weight and suffers absolutely no inconvenience from his condition. External manipulation gave no pain whatever. The outlines of the kidney were indistinctly made out. Killed for further examination.

P. M. Kidney imbedded between the abdominal muscles, but the peri-renal structures alone were adherent. The kidney was free and devoid of adhesions and showed upon section no evidence of compression.

Experiment 50. Sept. 10. Large size dog. Weight 16 kilograms. Left kidney exposed and implanted between the transverse and oblique muscles. The circum-renal tissue was left undisturbed and in drawing the divided edges of the transverse muscle together the tissues about the root of the kidney were included in the stitches.

Given 4 Cc. of Magendie's Sol. and removed.

Sept. 11. Takes food and shows very little signs of the operation.

Sept. 12. Eats and drinks.

Oct. 15. Appetite good. External wound healed with the exception of a small sinus. The unimplanted kidney removed.

Oct. 16. Takes food and water.

Oct. 17. Appears lively.

Jan. 26. The animal appears well, eats heartily and has gained in weight.

The outlines of the kidney can be imperfectly made out by palpation. Killed for further examination.

P. M. The kidney loose and lies unaffected in its new position. The circum-renal tissues attached to the adjacent sides of the muscles. Upon section, the transverse muscle separates, exposing a portion of kidney free of all adhesions.

EXPERIMENT 51. Nov. 5. Small size dog. Weight 9.5 kilograms. Left kidney exposed and implanted between the abdominal muscles as in the preceding experiment. Given 4 Cc. of Magendie's Sol. and removed.

Nov. 6. Walks about. Takes food freely.

Nov. 7. Same.

Nov. 16. Appears lively; eats well and apparently recovered. The unimplanted kidney removed.

Nov. 17. Appears lively. Eats and drinks.

Nov. 18. Same.

Nov. 20. Death from an accident occurring during the removal of the animal to other quarters.

P. M. The implanted kidney unaffected and firmly attached in its new position.

EXPERIMENT 52. Nov. 7. Small size dog. Weight 7.5 kilgorams. Left kidney exposed and implanted in the abdominal walls. Given 4 Cc. of Magendie's Sol. and removed.

Nov. 8. Refuses food. Drinks a few ounces of water.

Nov. 9. Eats and drinks.

Nov. 10. Same.

Nov. 28. Appears hearty. Eats freely. Anæsthetized preparatory to the removal of the remaining kidney. During this, the anæsthetic was pushed with a fatal effect.

P. M. The implanted kidney firmly imbedded. No evidence of any pressure visible.

EXPERIMENT 53. Dec. 21. Same dog used in this that served in experiment 14. The uninjured kidney was exposed through a lumbar incision and deprived of its capsule and circumrenal structures. It was now thoroughly enveloped in the folds of the great omentum and thus sutured to the abdominal wall. Given 2 Cc. of Magendie's Sol. and removed.

Dec. 23. Same.

Dec. 24. Took a few ounces of milk, looks dull and lies quietly in one place.

Dec. 25. Same.

Dec. 26. Improved.

Dec. 27. Appetite better and appears stronger.

Jan. 5. Still presents a dull appearance. Appetite varying and rather weak. The external wound had largely healed.

Jan. 29. The external wound had entirely healed excepting one fistulous track, which at times discharged a purulent fluid. From the last to the present date the animal would eat well for a time while the fistula would be discharging, when this closed up the animal refused to eat, appeared drowsy and gave evidence of the absorption of septic matter.

Feb. 13. Dead.

P. M. The kidney that had been shut was firmly healed. The other was enclosed in an abscess cavity which communicated with the exterior through a fistulous track. The walls of the cavity were formed by the attached omentum upon the inner side and the abdominal wall upon the outer side. The kidney itself presented upon its exterior a worn and ulcerated surface.

Death from peri-nephritic suppuration.

RÉSUMÉ.

As deductions from the foregoing, I beg to submit lor urther consideration the following conclusions:

INJURIES OF THE KIDNEY.

(1) The disproportion which frequently exists between the cause and the effect in injuries of the kidney can alone be explained upon its peculiar anatomical structure, its physiological function and the frequency with which this organ is found in a more or less abnormal condition at the time of the accident.

(2) The external damage offers no safe criterion as to the extent of the internal injury.

(3) However slight the injury may seem, no definite conclusion can be reached as to its extent or its ultimate termination.

(4) In view of the uncertainty which ever surrounds the diagnosis of conditions in regions remote from the ocular inspection or the digital touch the prognosis should always be guarded.

(5) The sequelæ which frequently attend even trivial injuries should be kept carefully in view in rendering our prognosis and shaping our treatment.

(6) In all operative attacks upon the kidney, the capsule and perirenal structure should be preserved as carefully as possible, since these not only add to the strength of the purchase, but afford additional protection against hemorrhage and sepsis.

(7) A gun-shot injury amounting to a simple perforation is best controlled by the application of a "purse-string suture" to both orifices.

(8) This may be reinforced by a covering of peri-renal structure drawn together in a similar manner.

(9) The hemorrhage from superficial lacerating wounds of the kidney can confidently be arrested in the majority of instances by means of a single or double purse-string suture, applied one Cm. or more from its edge.

(10) The great omentum can frequently be employed as a valuable adjuvant in controlling the hemorrhage and in adding to the safety in many operations upon this organ.

(11) Incised wounds whose aseptic nature is questionable are best treated by tamponade and drainage through the loin.

(12) Wounds of the pelvis should be closed with a double row of sutures, as an additional measure against the formation of a fistula.

(13) Unless the wound of the ureter is singularly slight as compared to the size of the duct, nephrectomy is, as a rule, indicated as the most practical step.

(14) The incision in partial resection for the relief of an injury should be made distant from the contused region to insure the apposition of two healthy renal surfaces.

NEPHROLITHOTOMY AND NEPHRORRAPHY.

(1) The choice of the incision in all operative attacks is largely to be determined by the nature of the condition and the character of the operation.

(2) Where the operation is of the character of a nephrotomy, dependent upon some cystic or suppurative process, the lumbar is the preferable incision.

(3) Whenever the lumbar incision becomes insufficient the space can be enlarged by another incision in a horizontal manner after the precepts of König, or as recommended by Newman.

(4) Unless specially contraindicated by reason of sepsis or other valid causes the abdominal incision should be preferred.

(5) "Early diagnosis and successful treatment go hand in hand." (Newman.)

(6) Procrastination means untold suffering to the individual and the steady increase of the dangers militating against the ultimate success of the operation.

(7) The renal artery can safely and successfully be compressed. rendering not only the operative field bloodless, but adding to the thoroughness of the operation and the chances of its success.

(8) The closure of the wound, unless contraindicated by drainage, should be preceded by a careful irrigation of the pelvis and a thorough removal of all blood clots.

(9) Whenever practicable, an incision through the kidney substance should be given the preference over one performed through its pelvis.

(10) The bottom of a renal incision should be approximated through deep sutures while the superficial edges are united by a separate row of superficial stitches.

(11) If the kidney has been much disturbed it should be stitched *in situ.* (Jacobson.)

(12) In anchoring a floating kidney it should be replaced as nearly as possible in its natural location.

(13) In a dog the implantation of the kidney between the transversalis and internal oblique muscles is a practicable and feasible step.

(14) In such an instance changes in the organ thus submitted are not sufficient to have any practical bearing upon the success of the procedure.

(15) The feasibility of a somewhat similar step in the human subject is questionable.

EDITORIAL ARTICLES.

THE ULTIMATE RESULTS OF OPERATIONS FOR REMOVAL OF THE UTERUS OR ITS APPENDAGES.

Of the achievements of surgery during the past twenty years none have been more far-reaching in their result than those which have had to do with the uterus and its appendages.

Each organ and region of the body that has yielded successful results when subjected to surgical attack, has likewise its list of failures and limitations to be registered, which is nothing more than saying that surgery is not carpentery nor blacksmithing, that human bodies are not chemical retorts, that all the processes of life cannot be weighed or accurately calculated in any given case.

Pelvic surgery likewise is subject to limitations similar to those which attend surgical work in other parts of the body. This branch of surgery, however, presses itself upon our attention more forcibly and continually than some others, because of the frequency of the conditions which call for its intervention.

It is so recent in its growth, and its advances and triumphs have been so marked, that until quite recently the professional mind has been preoccupied with the new possibilities which each decade has been converting into actualities. The professional life of many surgeons, who count themselves still young, runs back beyond the year 1858, when Spencer Wells began his career as an ovariotomist. Not longer ago than early in the seventies is it that the importance of chronic inflammatory diseases of the uterine appendages was recognized by Tait, and he entered upon his forcible and fruitful work of operating for their relief. It was in 1872 that before the Medical Society of the County of Kings, Marion Sims read a brilliant paper, in which he stated his convictions as to the role played by septicæmia in causing deaths after ovariotomy, and made suggestions as to the use of drainage to prevent it. In the same year, John Byrne communicated to the same society his experiments in the use of the electric cautery in destroying malignant disease of the uterus. At the close of this same in 1879, Czerny, of Heidelberg, began to perform surgical hyster fruitful decade for, uterine cancer.

The decade of 1880–90 may properly be said to have been a period during which in the domain of pelvic surgery a careful testing and sifting of diagnostic significations, operative indications and technical methods has been going on. It is an omen of promise for the future that to-day on every hand surgeons are bringing together their ripened experiences, so that out of their aggregation more satisfactory conclusions may be reached as to the real benefits which the surgery of these days has to promise to those suffering from pelvic disorders.

In March, 1890, Coe, in a paper before the New York Academy of Medicine, called attention to the fact that recovery after operations for the removal of diseased uterine appendages was by no means always synonymous with restoration to health, and that in some instances sequelae were left which were more intolerable than the original conditions to relieve which the operations were performed. In April, 1891, the French Congress of Surgery devoted a session to the consideration of the Remote Results of the Removal of the Uterine Appendages, being favored with memoirs on the subject by Lawson Tait, and by Richelot. At the recent Congress of American Physicians, in September, 1891, the same theme wsa discussed, having been introduced by a paper on the subject by Lusk. Numerous additional communications on various aspects of this subjects have recently been made to other societies or have appeared in various medical journals. The theme is thus seen to be one of present interest, as well as of great importance.

The accepted indications which, in the view of most if not all surgeons, now justify the removal of the uterus or its appendages may be outlined as follows:

EXTIRPATION OF THE UTERUS.—This procedure is indicated *a*, in cases of inveterate and intractable prolapse of the uterus; *b*, in cases of intractable inversion of the uterus; *c*, in certain cases of myoma, in which despite the energetic and intelligent use of other measures, the tumor continues to grow and causes serious disabilities or suffering from pressure effects, or provokes persistent serious hemorrhages, or undergoes cystic degeneration, or develops serious septic conditions; *d*, in cases of malignant disease of the uterus as long as the diseaset remains limited to the uterus itself. It should be noted that many eminent surgeons limit this indication for hysterectomy to those cases of malignant disease in which the body is invaded, while for those in which the disease is limited to the cervix, an amputation of the cervix, supravaginal by the knife, supplemented by the cautery, or by the cautery knife alone, is substituted; *e*, possibly in cases of suppurating pelvic peritonitis, in which the uterus and appendages are blended together in a mass of adhesions that cannot safely be separated when reached through an abdominal incision, and in which the removal through the vagina of the uterus by morcellement (the method of Pean and Segond) gives abundant access to multiple foci of suppuration and ensures subsequent adequate drainage.

REMOVAL OF THE APPENDAGES.—Ovarian neoplasms constituted the first established indication for removal of a diseased appendage—to this are now to be added:

b. Uterine myomata attended with serious menorrhagia.

c. Chronic and intractable inflammation of the ovary and Fallopian tube, attended with pain and disability.

d. Suppurative inflammation of the Fallopian tube, with retention of septic products within the distended tube.

e. Marked nervous disturbances, provoked by each recurrence of menstruation.

The question of primary mortality is only indirectly concerned in the present inquiry. The perfected technique of to-day, added to accumulated experience in the management of the ever-varying complications which distinguish individual cases, has reduced to very small proportions the direct danger to life of these operations when done by gentlemen who are adepts in the one and furnished with the other. Thus Tait claims to have reduced his death rate after operations for removal of the appendages to less than 3 per cent. Wylie claims a similar low mortality in his last 300 cases. Lusk lost but

2 out of 65 patients operated upon similarly. Pean reported 60 operations of hysterectomy for the relief of pelvic suppurations without a death, and Segond has reported 42 similar cases with but 4 deaths. In vaginal hysterectomy for cancer, the recent experience of a number of continental operators (Leopold, Kattenbach, Ott, Pean) shows a mortality of less than 5 per cent.; a favorable showing which is equalled by the results of Cushing, Wylie and Krug on this side of the Atlantic.

The proportion of absolute recoveries, meaning thereby the relief of the pains and disabilities of disease and restoration to a life of comfort and usefulness, is by no means so great.

Coe, in his paper already referred to, dwelt with emphasis on subsequent intra-pelvic indurations and adhesions, resulting from localized peritonitis, and causing persistent pelvic pain, uterine congestions (with or without pseudo-menstruation), vesical and intestinal disturbances, due to intestinal adhesions and cicatricial tractions. Subsequent fatal intestinal obstruction is not an unknown result of such adhesions.

Tait states that ablation of the appendages, in cases of chronic inflammatory affections thereof, often does not bring about immediate relief to pain, but adds the reassurance that this pain rarely persists for more than a twelvemonth, though for a time it may have caused much disappointment to the patient and a lot of trouble to the surgeon. Valuable observations on this point have been made by Lee, who has brought together full and accurate reports of the conditions during a period not less than five years after operation of 36 cases of removal of the appendages. In five of these cases relief from pain continued at the end of that time still quite imperfect; in four more, though the relief is considerable, notable pain still persists; in two instances it was not until after the lapse of two years that the pain was relieved; in four cases relief was obtained after one year; in six, within periods varying from two to six weeks; thus leaving only four out of the whole number in which immediate complete relief was experienced.

This persistence of pain for some time after operation accords with my own personal experience. Within the past two years I have been compelled to remove the appendages for the relief of chronic inflammatory conditions in four instances. In two of these the adhesions were dense and extensive, making the operations complicated and severe; in two the absence of such complications rendered the operations facile; all recovered excellently from the operations, but all continue to assert that their old pain is not relieved. In two of these cases a life of constant pain had been endured for nine and twenty-two years respectively before operation. The pain habit—for there is such a thing—demands time for its abolishment in such cases; the removal of the local disease, essential and important as it is, is but the first step toward ultimate recovery. I think that I have reason to believe from the reported experience of others that ultimate relief will yet be acknowledged by all these patients. I am encouraged to this belief by the result in a case not included in the number above referred to, in which I recommend a large cysto-adenoma of the broad ligament; the enucleation of such a growth from between the layers of the broad ligament leaves behind local anatomical conditions somewhat similar to that remaining after the enucleation of adherent and distended tubes and ovaries. In the case in question not only was the ovary and tube on the side of the tumor removed with the tumor, but inspection showing that the ovary was the seat of extensive cystic degeneration it was also removed. The patient made an uncomplicated and rapid recovery from the operation, but for nearly two years thereafter she continued to complain of severe pelvic pain, apparently in the intra-pelvic cicatrix left by the ablation of the tumor. But quite recently she presented herself for examination with the agreeable intelligence that at last her pains had disappeared.

Allusion, at least, ought to be made to certain occasional sequelæ which in some cases are unavoidable, and in others are referable to defective technique, and which are likely to diminish in frequency with increase of skill in operators. I refer to herniæ forming in the cicatrix of the wound in the abdominal wall, to fistulæ from ligatures that have become infected and remain a source of suppurative inflammation within the pelvis for indefinite periods; to fecal and urinary fistulæ which in rare cases result from persistence in attempts to separate dense adhesions to intestine or bladder. Tait says that he no longer ever permits himself to be checked from breaking adhesions by the fear of causing a rent either of the bladder or of the intestine, although in many cases he has seen to form and to persist for several months urinary and fecal fistulæ, because he has always been ultimately successful in closing such fistulæ. Whether an equal success shall attend the efforts of other operators is a matter on which testimony is yet to be accumulated. I cannot think, however, that it can ever be generally felt that rents into the intestine or bladder, complicating the enucleation of inflammatory masses within the pelvis, are not complications both formidable and to be dreaded, and that, even if immediate danger to life is averted, the remote results of consequent adhesions, undue traction, and the dangers of secondary operations, must entail much of suffering and disability and peril.

Mental Disturbances are undoubtedly among the possible ultimate sequlæ of the removal of the uterine appendages. How many, if any, instances of insanity, or morbid mental depression post operationem are fairly referable to the operation itself, is difficult to determine. Certainly in not a few instances some warping of the mind has already resulted from the long continued suffering which patients have undergone before being submitted to operation. In some temperaments an exaggerated idea of the damage which they have received as individuals, by the loss of their ovaries, may conduce to intensification of such mental disturbances. In most instances the lapse of time, the subsidence of pain, the improvement in general health, and the influence of reassuring advice suffices to dispel this; possibly in very exceptionable cases the unstable mind may become pushed over into confirmed insanity. Certain mental eccentricities and unevennesses of temper are accepted as the frequent natural attendants of the establishment of the menopause. Now from these nervous manifestations the artificial menopause is not free ; but these disturbances are transient in their nature. Aside from these, I have been unable to find any observations which convince me that by the loss of her uterine appendages, a woman was made especially susceptible to the development of mental alienation, or to make this possible remote consequence a matter that should have any weight in determining in a given case whether the appendages should or should not be removed.

Sterility is, of course, a result of the loss of the uterus or of the ovaries. Perhaps a way to put it more consistent with the facts of the case is, that in the presence of the conditions in which removal of the uterus or its appendages is required as a therapeutic measure, fecundity is not restored by it. This latter way of putting it is more true to the facts in all cases except those of general neurosis, which are sometimes benefited by castration. In such cases, however, the loss of their power to procreate is not without its compensations from the view point of humanity.

The possibilities of marital congress, destroyed by disease, except under the penalty of great pain, are restored, as a rule, by the operations in question. The effects of the loss of the appendages upon the sexual appetite has been the subject of much inquiry. The weight of testimony seems to me to be that whatever the effects may be they are indirect, through the general changes which attend the menopause that has been induced. The lapse of some years must be required to secure the full adjustment of the economy to the changed conditions of life, whether the menopause comes in the order of nature or is induced by the surgeon. In Lee's report previously referred to, there is a systematic attempt to give the required information after the lapse of a number of years; but he has been able to obtain the needed data in only 11 cases—of these, in 8 he reports the sexual appetite to have been unaffected; in 3, to have been diminished. Here, again, in much that has been said, the subject has been approached from the wrong direction. In the cases in which a properly conservative surgeon would advise an operation the sexual appetite no longer exists; in the inflammatory cases the pain which the marital approach causes is so great as to preclude the act altogether. It would be more true to the facts to say that in the great majority of cases the ultimate effect of these operations is to restore the sexual sense to its normal condition, but that in a certain minor proportion of cases this appetite does not return. In any event, the point seems to me to be one only of curiosity, and to have no practical bearing in influencing surgical work.

The recurrence of malignant disease after removal of the uterus or its appendages is subject to the same laws which govern such disease when appearing in any other part of the body. While the female breast is the most frequent seat of malignant disease of any organ or portion of the body, the uterus is nearly as susceptible, the proportions of carcinoma, according to the tables of Williams (ANNALS OF SURGERY, Oct., 1891), being as 6 to 7. The ovary, though rarely the seat of primary attack, is not wholly exempt—the proportion of primary ovarian to uterine carcinoma being as 1 to 60. In sarcoma, however, the proportions are reversed—comparatively rare in either the uterus or ovary—the proportions are as 12 of the ovary to 1 of the uterus. The breast, however, still exhibits the greatest susceptibility in the proportion of 50 of mammary to 1 of uterine sarcoma.

The best statistics as to the cure of malignant disease in other parts of the body are those that pertain to the lower lip and to the breast. Butltin, in his work on "The Operative Surgery of Malignant Disease," grants 160 survivals for three years and over, without recurrence, out of 424 patients operated upon for carcinoma of the lower lip, a rate of a little over 38 per cent. Dennis claims 30 per cent of survivals for three years and more, without recurrence, in 81 cases of carcinoma of the breast operated upon by himself. It is not probable that the operative work of the future will show any better results in surgical contests with cancer in any part of the body than is represented in the figures just given, until some remedy against the constitutional condition which underlies the development of all cancer, and which too often contributes to the development of this disease in many patients who have passed even the three-year limit, which is now generally—though in my opinion wrongly—accepted as indicative of the absoluteness which the primary local disease had been extirpated.

Careful and unbiased students must accept with much reservation any claims that are made for operations—whatever their character—for removal of malignant disease of the uterus or appendages, whose ultimate results are asserted to be better than those noted above as to the breast or lips. The careful surgical statistician of the present and of the future is compelled to exclude from all consideration in his studies and in his conclusions every case in which the character of the diseased tissue removed has not been examined and certified to by a pathologist of recognized position. The lack of such pathological testimony requires us to reject a large proportion of the reports that have hitherto been made of the results of operative work in this field with respect to their value as data upon which to base a decision as to the method of operating most likely to secure the best ultimate results.

Equal importance, from the practical standpoints of the choice of operative methods and the ultimate results, attaches to accurate and complete statements as to the extent of the disease present in the cases submitted to this or that operation. The difficulties which attend attempts to properly compare groups of cases subjected to different methods of treatment are so insuperable, the sources of fallacy are so many, that the rational philosophical surgeon will seek rather for the data upon which to found his judgment as to the value of operative methods in his knowledge of the natural history of cancer, its methods of growth and dissemination, and well established general surgical principles.

In the treatment of cancer of the uterus the operating surgeon is continually prevented from indulging even the hope of securing any permanent ultimate good result for his patients by the state of advancement which the disease has been permitted to attain before he sees the case at all. For instance in my own experience, out of the last 20 cases of cancer of the uterus that have come under my observation, in 17 the disease had already spread manifestly into the adjacent pelvic tissues, and nothing but palliative treatment for a brief time before the inevitable death was possible.

Of Carcinoma of the Ovary, I have one interesting observation to record in the person of a girl of twenty-five years of age, who two years ago presented herself to me with a large solid abdominal tumor, whose upper border reached up to a point midway between the umbilicus and the xiphoid appendix. She knew it had been growing for two years, and probably longer. I operated without delay, the chief complication of the operation was an area of dense adhesions which had formed between the upper anterior surface of the tumor and the abdominal wall; the right ovary proved to be the seat of the growth, which subsequent histological examination revealed to be a carcinoma, especially rich in cell constituents. The pathologist in submitting his report predicted a speedy recurrence. The patient made a good and prompt recovery from the operation. She resumed her work as a dressmaker, which for a period of two years since she has continued to perform. Within a few days, while preparing this article, I called upon her, found her still engaged in work about her house, cheerful and apparently unaware that there was anything serious the matter with her, but inspection revealed her anterior abdominal wall to be the seat of multiple scattered carcinomatous deposits, the most extensive being in the region of the adhesions that had previously existed with the tumor. In the left axilla was a large mass of enlarged glands.

The inevitable fate cannot be delayed many months, I think, but to the credit of the operation must be scored the more than two years of active useful life which she has since enjoyed.

The Ultimate Effects of the Removal of the Uterine Appendages upon the Nutrition of the Uterus. Under this head comes up for consideration the atrophic changes which are induced by the removal of the appendages. With rare exceptions, the uterus, whether hypertrophied by the presence of myomata, or in consequence of chronic inflammatory congestion, shrinks to its natural size, or possibly may undergo still greater involution. The myomatous tumors disappear, or cease to grow, menorrhagia is arrested, and an artificial menopause is induced. According to the experience of Tait the age of a patient has a marked influence upon the rapidity and course of these changes. He puts it thus, approximately:

Before the age of 40 years, 70 out of 100 tumors will disappear completely; between 40 and 50 they may not for the most part disappear entirely, but they will diminish in size sensibly; out of a total of 265 cases, in all but 8 the removal of the appendages brought about a complete relief to symptoms either by the complete disappearance of the tumor, or its cessation in growth, and the full checking of the menorrhagia. In the 8 exceptions subsequent hysterectomy was required.

The following personal observation illustrates happily these points:

A lady, who had been under my care for ten years or more, was the subject of a small interstitial myoma, producing obstinate menorrhagia, and accompanied with epileptiform attacks at long and irregular intervals. By repeated curettings of the uterus, and by the prolonged administration of large doses of ergot, she was kept along from year to year with the expectation that the natural menopause would bring relief to her symptoms. The age of 51 years found her with her condition in no wise ameliorated; she flowed, if anything, more copiously and continually than ever. Finally I removed her appendages. The operation was done a little more than one year ago. From that day she has lost no more blood, and what is also interesting, she has had no convulsion. Her general health is better than it has been for many years. In the cases in which the appendages are removed for the relief of chronic inflammatory conditions, the atrophic changes in the uterus are not so prompt and certain as in cases of myoma. The arrest of menstruation is sometimes delayed for months and in some cases never takes place at all,

According to GLOEVECKE (Arch. f. Gyn., 1889, Bd. 35. Hft. 1, p. 1) taking all classes of cases together menstruation is suppressed in 88 per cent. of cases; in the remaining 12 per cent. it becomes rarer and less abundant.

What is the effect on the remaining generative organs of the *extirpation of the uterus only, ovaries being preserved?* The author above referred to (GLOEVECKE) is able to answer from the observation of 14 such cases. He says that after the extirpation of the uterus the menses are always suppressed, and without ever giving rise to vicarious hemorrhages of any practical consequence. For a while after the operation the times of the usual menstrual crisis may declare themselves by vague pains and malaise in the pelvis, such as usually characterize the menstrual tmolimen. The loss of the uterus appears to have no influence upon the remaining genital apparatus. The vulva, the vagina, and according to all appearance the ovaries, also remain normal. It appears certain that the function of ovulation persists intact until the occurrence of the natural climacteric.

I have thus very briefly traveled over a very wide field; my effort has been to summarise, in a condensed manner, the ultimate results, as

I have been able to gather them from the published work of others, and from my own observations, which have attended the recent major surgery of the uterus and its appendages. One cannot fail to be impressed, as the subject passes in review, with the vast possibilities of benefit which inheres in this branch of surgical work. Its limitations at the same time are clearly defined. It is no field into which one can venture with rash footsteps. Operative mutilation in any part of the body is to be deprecated, and accepted only when clear proof exists that other measures are futile. Especially should this be the case when organs are concerned which are so intimately related to the higher functions of life as are the uterus and its appendages.

But all the more forcibly does the very important character of the organs involved urge the surgeon—when once the indications for his interference are clearly established and the futility of temporizing methods are apparent—to radical and thorough work, that out of the wreck which has already been worked by disease, he may wrest as much as possible for future good. LEWIS S. PILCHER.

INDEX OF SURGICAL PROGRESS.

ABDOMEN.

I. **Echinococcus of the Liver Operated on by Costotomy.** By DR. A. BRUNNICHE (Copenhagen). October 17, 1886, Th. B., a young Icelandic woman, æt. 20, entered the hospital with symptoms which apparently indicated a right-sided tuberculous pleuritis, namely, infiltration of the right apex, change in the voice, sweat, failure of the general nutrition and disturbances of digestion. Examination of the sputa was not then well in vogue in that hospital. As the patient began to have rigors and grow worse, a trial puncture was made without result. In December a greater prominence of the right hypochondrium and epigastrium was noticed, while the anterior border of the liver was felt three inches above the umbilicus. Friction sounds were audible on the right side in the fossa infraspinata. December 13 a second trial puncture was made in the ninth right intercostal space and a small quantity of purulent fluid drawn off; this was examined under the microscope, but revealed nothing definite. As the diagnosis of empyæma was thought certain, cystotomy was performed December 15, and a six centimetre piece removed from the tenth rib in the posterior axillary line. About 1,100 grams of fœtid pus were removed which contained large yellowish and gelatinous masses as well as the remainder of a number of torn membranes which presented a distinct stratification and were studded with prominences of the size of a pea. No hooks could be found. The cavity could be felt below as a funnel-shaped hole piercing the smooth surface of the diaphragm. The patient bore the operation well. The purulent discharge diminished, but the wound could not be closed on account of the discharge of bile. The prominence of the right side decreased ; several calcareous masses were removed. The patient's appetite and general condition improved, although she constantly lost quite a quantity of bile. The cavity decreased in size, the fistula contracted, the drainage-tube was removed; the patient increased in weight and had naturally colored stools. The fistula finally closed entirely, and the patient was discharged as cured February 23, 1887. The writer cites two similar cases. Firstly, that of Krause (*Sammlung Klinischer Vorträge*, v. R. v. Volkmann, No. 325, 1888), where a young man, æt. 27, presented an echinococcus cyst situated upon the upper convex surface of the liver necessitating, on account of the upward pushing of the diaphragm, the performance of costotomy and the opening of the cyst through the diaphragm. A drainage tube was inserted and the wound preserved free from irritation or infection, although a large amount of purulent fluid was discharged. Secondly, that of James Israel, (*Verhandl. d. d. Gesellschaft f. Chirurgie*, viii, 1879, 1, p. 17), which was treated after Volkmann's method, costotomy, and as it could not be determined whether the diaphragm was adherent to the tumor the wound was tamponed with carbolized gauze for seven days, and finally an incision was made into the cyst through the diaphragm.—*Hospitals-Tideude*, No. 30, 1890.

F. H. PRITCHARD (Boston).

REVIEWS OF BOOKS.

A MANUAL OF OPERATIVE SURGERY. By FREDERICK TREVES, F. R. C. S. Two volumes, pp. 775. Lea Bros. & Co., Philadelphia, 1892.

Mr. Treves in this admirable manual of operative surgery has not entered at any length into questions of diagnosis and treatment, and has given little attention to historical subjects; but has in each instance practically assumed that operation has been decided upon and has then proceeded to give the various operative methods which may be employed, with a criticism of their comparative value and a detailed and careful description of each particular stage of their performance. No attempt has been made at the fullness and completeness of a system of surgery or an encyclopædia. Especial attention has been paid to the preparatory treatment of the patient and to the details of the after treatment of the case, and this is one of the most distinctive among the many excellent features of the book. The text upon which Mr. Treves bases his remarks is contained in the opening sentence, a quotation from Sir James Paget, "Never decide upon an operation, even of a trivial kind, without first examining the patient as to the risks of his life. You should examine him with at least as much care as you would for a life insurance." The author adds that as no operative procedure is absolutely without risk there should be a reasonable proportion preserved between the danger of an operation and the mortality of the disease. The general principle involved is well expressed in these remarks, "If the mortality attending ovariotomy were to be increased three-fold beyond the present percentage the operation would still be justifiable, inasmuch as the death rate in untreated cases is so high as to leave but little prospect of life. On the other hand, were the death rate of hysterectomy lower by three-fold than it is it would not sanction the performance of that operation on account of a small fibroid tumor which ceases to grow, which produces no symptoms, but which the patient as a whim is determined to be freed from."

There are also local risks which should not be forgotten. The removal of a small growth near the eye may be followed by an ectropion far worse as a deformity than the growth itself, and a trifling operation for the relief of a slight case of Dupuytren's contraction of the palmar fascia has led to sloughing of the tissues of the hand and a crippling of the limb infinitely more severe than that attending the original disease. In considering the risks depending on the condition of the patient, Mr. Treves enumerates the following factors: 1. Age. The mortality of all operations is lowest between the age of five and fifteen. In patients over forty the mortality is nearly three times as great as those under twenty. In young and healthy children the chief danger is from shock. The author concurs with Mr. Marsh in his belief that the widespread view that children bear the loss of blood badly is incorrect. If the weight of the body be taken in conjunction with the amount of blood lost he thinks it will be found that children bear hemorrhage well. As to influence of old age upon operations, Mr. Treves quotes freely from Sir James Paget's classical lectures upon this subject. 2. Sex. The author believes that the fact which appears to be shown by statistics that women bear operations better than men may be explained in that they are more tolerant of confinement to house and bed, lead less active lives, are usually more temperate and regular in their habits and owe not a little in addition to natural determination and patience. Operations during menstruation, pregnancy and lactation are considered undesirable. 3. The strength of the individual is carefully considered. Attention is called to the fact that mere robustness and muscular strength are not necessarily favorable factors from an operative standpoint, but that the individual who is the subject of chronic disease will, if he has escaped visceral changes, often do better than his stronger brother by reason of the long confinement during which his digestive processes and, indeed, all his vital functions have adjusted themselves to what the author calls the "molluscous condition." He emphasizes this point by advising rest in bed and a modified diet previous to all operations of any magnitude. 4. Obesity and plethora are not considered favorable circumstances. 5. Alcoholism is thought to contra-indicate any but the most necessary and urgent procedures. 6. Scrofulous and tuberculous cases, on the contrary, do well as far as speedy recovery up to a certain point is concerned, but the general experience of the profession has been that of the author apparently, who quotes Verneuil to the effect that operations upon such patients "abound in half successes, incomplete results and unfinished cures." 7. Other constitutional conditions may be grouped in two classes. (*a*) Those which have no deleterious influence so far as the operation is concerned, which would include syphilis, cancer, anæmia, rheumatism, gout, etc., and (*b*) those which strongly contra-indicate operation, such as leucocythemia, hæmophilia, scurvy, including inflammation, diabetes, visceral diseases of all sorts, and acute diseases generally. The author lays down the absolute rules that in no case should an operation on an adult be undertaken without a preliminary examination of the urine being made; and that before performing an abdominal operation it should be a matter of routine that the urine should be examined daily for not less than one week. The wisdom of this advice is undeniable, but the practical difficulties which interfere with its adoption by the busy surgeon are familiar to all of us. Many lives would be saved, however, beyond all question, if it were more generally observed than it is. The preparation of the patient is fully described and a brief but interesting account of the proper training of the surgeon follows. Mr. Treves thinks that " He may do well who is bold, but he will do better who has precise knowledge." "The least success follows the hand of the man who retains throughout an operation a speculative spirit, but depends largely for conditions and upon the fortune of events for results." "The days of the so-called 'brilliant' surgeon are over. Brilliancy, as associated with operations, will probably concern the reckless manipulations of irresponsible hands or the fortunate thrusts of the over bold." "The time is even now not long past when the surgeon would whip off a leg or remove a stone with somewhat of the fever and éclat of a conjuror who draws an unexpected rabbit from his sleeve." When he comes to the consideration of the instruments used in making a wound the mis-use of the director excites his especial reprobation, and while he admits that it is of service in certain cases, as fistula, herniotomy, etc., he believes that the art of operative surgery would greatly benefit if it were banished entirely from the list of surgical instruments. Among the local conditions which influence primary healing, hæmostasis, the avoidance of rough sponging and irritating antiseptic solutions and the thorough obliteration of the wound cavity are emphasized In the further treatment of the wound all credit is given to Sir Joseph Lister for "having established upon a new and scientific basis the ancient art of healing." Mr. Treves uses as a dressing sponges dusted with iodoform and held in place by absorbent wool and a firm bandage.

The section on Anæsthetics has been written by Mr. Hewett, Anæsthetist to the London Hospital. We were pleased to note the remark that "generally speaking nitrous oxide is the best anæsthetic in very brief operations, *and ether for longer cases.*"

The advantages and disadvantages of these anæsthetics and of chloroform and the A. C. E. mixture are discussed.

The whole section on the Ligature of Arteries is an admirable one and altogether the best with which we are familiar, with the exception of the chapter on that subject in Prof. Agnew's Treatise on Surgery. It is to be noted that ligature of the common iliac artery is recommended by the intra-peritoneal method through a median abdominal incision after the plan used in tying the internal iliac. In relation to the latter vessel the advantages are said to be as follows: The artery is easily and fully exposed; the needle can be passed with less risk to the vein or ureter; the operation requires but little time; the ligature can be applied accurately at the spot determined upon; the condition of the artery and the surrounding parts can be made out and the diagnosis confirmed or modified. All these seem unquestionable and the objection based on the risk of acute peritonitis has not much force at the present day.

Mr. Treves has performed the operation of removal of Meckel's ganglion five times with the result of return of neuralgia in two cases within twelve months, in another at the end of two years, and in a third at the end of three years; a fifth patient died of cancer within six months. He thinks it is questionable whether this neurectomy is of permanent value.

His method of ligating the lingual by aid of a blunt hook with which he fixes and draws outwards the digastric tendon is worthy of special notice, as Mr. Treves is an advocate of this operation as a preliminary to excision of the tongue, and has done it on a number of occasions.

In the section on Amputation the plan which has been followed by the author includes a description of all the best methods of each amputation followed by indications for choice among them. He objects to transfixion for the reasons that the flap cannot be cut with precision; the skin is divided together with the superficial layer of muscular tissue; vessels may be transfixed or cut unduly short: much tissue at the base of the flaps escapes division and requires to be cut before the bone can be cleared for sawing. He adds "the method belongs to the past, to a period of 'brilliant' surgery, when the shrieking and terror-stricken patient was held in the amputation chair by many lusty assistants and the spectator doubtless stood by with a fob watch in his hand."

An entire chapter is devoted to the inter-scapulo-thoracic amputation which removes the upper extremity and at the same time the scapula and the outer two-thirds of the clavicle. He recommends excision of the middle third of the clavicle as the first step of the the operation, followed by the formation of the flaps and the division of the tissues connecting the scapula with the trunk, no disarticulation at the shoulder joint being attempted. The early ligature of the third portion of the subclavian or first portión of the axillary renders the hemorrhage during this extensive operation much less than might be expected.

Among special amputations the value of "Chopart's" is questioned on account of the tendency to subsequent elevation of the heel. Subastragaloid amputation in which the only bone of the foot that is left behind is the astragalus, forming the summit of the stump, is described as giving a more elastic stump on account of the preservation of the ankle-joint than either Syme's or Pirogoff's amputation. Four methods of performing it are described, preference being given to the one by a heel-flap similar to that made in Syme's amputation, and to the oval method which is not markedly different. In the lower third of the leg the long posterior flap is preferred and at the middle of the leg a similar flap made by one of two different methods is recommended. At the upper portion of the leg, at the spot described as the "place of election," that is about a hand's breath below the knee-joint, Farabœuf's operation by long external flap is the one recommended, and is thought by Mr. Treves to be a very substantial improvement on previous operations and to form a valuable addition to the resources of the surgeon.

In the treatment of ununited fractures he prefers resection with subsequent imuwbiliration by splints or by an apparatus, to any of the more complicated methods which have been employed. He has had better results in ununited fractures of the humerus, femur, tibia and radius since he has discarded the use of the wire, which, he says, so far as the long bones are concerned, is a "delusion and a snare."

As to ununited fracture of the patella he describes Lister's methods of wiring[1] the fragments, but offers as an alternative a plan by which Malgaigne's hooks are made to take the place of the wire, the bones having been exposed and their surfaces freshened as in the operation by wiring. He thinks there are several advantages connected with this method, including better and firmer approximation and easier withdrawal of the apparatus.

As to wiring in recent fractures he says it has not come into general use among surgeons and adds that a very satisfactory degree of success attends the ordinary and simple mode of dealing with the fracture.

Volume II opens with a section on Plastic Surgery.

The closing of the wound in operations for hare-lip by means of pins is objected to for fear of sloughing of the portions of the flaps beneath the ligature and of scarring from the pins. If the latter, however, are made of fine steel, well tempered, very slender, and are removed in forty-eight to seventy-two hours, these objections will not be found important, and the writer believes that accurate and speedy approximation can be obtained more readily by the use of pins than by the employment of sutures and with equally good results. The difference is, however, a trifling one, as in either case, owing to the well-known tendency of clean-cut wounds of the lips and face to heal by first intention, union is generally rapid and scarring insignificant.

In the section on the neck, which embodies an excellent description of tracheotomy, thyrotomy and laryngectomy, we note the absence of any allusion to intubation of the larynx in croup and diphtheria and think the value of the book will be increased by including some mention of this procedure in subsequent editions.

The section upon Abdominal Surgery is very full and satisfactory, especially as regards intestinal operations. Every known variety of intestinal suture is described, although Lembert's is preferred. In the treatment of the simplest form of fecal fistula, in which a short, straight sinus leads directly from the gut to the surface of the abdomen, Mr. Treves, after taking every precaution to render sinus and gut as nearly aseptic as possible, excises by an elliptical incision the portion of tissue containing the fistula, which is not opened. The wound of the bowel is then closed with Lembert sutures and that of the abdominal wall by the ordinary interrupted suture. In one case of this kind he succeeded in permanently closing at one sitting a fistula through which all the contents of the bowels had been passing for some time.

In hysterectomy Mr. Treves still favors ligation of the ovarian and uterine arteries. He has not noticed in the history of this operation a single case in which it appears that there would have been an insuperable difficulty in ligaturing the ovarian artery and its companion vein, and thinks that if the pedicle can be so prepared that a serre-noeud, or a clamp can be passed around it, it is possible to secure the uterine arteries lying in this tract of tissue. If the ovarian and uterine arteries on both sides have been secured then, so far as the teaching of anatomy goes, the main blood supply and apparently the sole blood supply of the tumor has been cut off. He thinks it safe to infer that the serre-noeud, while certainly an admirable apparatus which has brought hysterectomy into the region of practical surgery, is not compatible with the accepted principles of modern times and will no doubt in due course yield to other methods.

He gives litholapaxy in children full consideration and quotes with apparent approval the now well-known views of Keegan in favor of the operation. As to the probability of relapse—*i. e.*, recurrence—due to the actual retention and subsequent increase of a fragment, (the only argument of any force against crushing as compared with cutting operations), he believes it will be very rare if the evacuator is thoroughly employed.

In the operations upon the thorax that of Estlander is carefully considered. Lannelongue's operation in the section on the brain is described under the head of craniectomy, though he notes the objection originally suggested we believe by the writer, to that term and the preference which should be given to the one now coming into more common use, namely "craniotomy."

In his description of the operation of resection of the spine in fracture, or in Pott's paralysis, he says that he has followed closely the account given by White, of Philadelphia.

The chapter on removal of the breast is an admirable one and fitly concludes this most excellent and trustworthy manual of Operative Surgery.

We have no hesitation in declaring it the best work on the subject in the English language, and indeed, in many respects, the best in any language. It cannot fail to be of the greatest use both to practical surgeons and to those general practitioners who, owing to their isolation or to other circumstances, are forced to do much of their own operative work. It contains, of course, numerous examples of the special methods of operating introduced by Mr. Treves, who is of a notably original turn of mind, many of them being positive and reliable additions to the art of surgery; but it is not for these that we feel called upon to recommend the book so strongly. It is rather for the excellent judgment displayed in the arduous task of selecting from among the thousands of varying procedures those most worthy of description; for the way in which the still more difficult task of choosing among the best of those has been accomplished; and for the simple, clear, straightforward manner in which the information thus gathered from all surgical literature has been conveyed to the reader.

The illustrations are excellent, and the typography of the work is all that could be desired. J. WILLIAM WHITE.

THE STUDENT'S SURGERY: A Multum in Parvo. By FREDERICK JAMES GANT, F. R. C. S., Senior Surgeon to the Royal Free Hospital. Philadelphia: Lea Brothers & Co. 1890. pp. xxx-817.

SURGERY: ITS THEORY AND PRACTICE. By WILLIAM JOHNSON WALSHAM, F. R. C. S., Assistant Surgeon to St. Bartholomew's Hospital, etc. Third edition, revised and enlarged, with three hundred and eighteen illustrations. Philadelphia: P. Blakiston, Son & Co. 1891. pp. xv-748.

Both of these books are intended to be concise, practical and efficient aids to students preparing for examination, and it is from this point of view that any criticism must be considered.

In Gant's Surgery the section on General Pathology carries one back fully twelve years. It is a surprise, and hardly an agreeable one, to find the ideas throughout this portion of the work ignoring all the advances of the past two decades, and in view of the generally accepted theories of germ infection it is courageous, to say the least, for an author to pass them by without even a chance reference. Thus one is surprised to read that "the antiseptic method of treatment was devised with the view of counteracting any contaminating influence from the surrounding atmosphere—due *perhaps* (the italics are ours) to *germinal matter*."

It is suggested that the proper distinction between fistula and sinus would be the presence or absence of a pyogenic membrane.

The possibility of the presence of a bacillus as a causative factor in the production of the infective surgical diseases is ignored, and the Pasteur treatment of hydrophobia is condemned by scant praise. During thirty-six years of hospital treatment he has seen but one case. "Curative treatment will be utterly useless although it may be possible to palliate symptoms and prolong life."

A short section is devoted to the Antiseptic Method of Wound Treatment, in which the different attempts to obtain union without suppuration are detailed and a synopsis of the Listerian method of operating is given. No mention is made of the many modifications that practice has made possible. The occasional intervention of carbolic acid poisoning is urged as objection to the adoption of the method.

It is a comfort on taking up Mr. Walsham's work to find our selves once again on solid ground and abreast of the times in Surgical Pathology. In the preface of this edition the author announces that Virchow's theory of imflammation has been adopted instead of that of Cohnheim, which was employed in the earlier issues.

We find that the bacteriological causes of inflammation and disease are treated fully and concisely and the possibility of the prevention of inflammation by the application of proper antiseptic precautions is fully discussed, while in the former work imflammation is considered not only as the certain result of an injury, but as the essential element in the establishment of the reparative processes. '

In Mr. Walsham's surgery the accepted definitions of fistula and sinuses are retained. No especial attention is devoted to gunshot injuries, while in the former work they are treated exhaustively. Mr. Gant apparently has but little faith in the tubercle in surgery. It is only mentioned once in connection with bone diseases, and in his work is not considered in the portions of the work dealing with imflammation of the glands, osteo-myelitis periostitis, diseases of the joints and other regions, where at the present time tuberculous diseases are supposed by the majority of the working surgeons of the day to be potent, if not the most potent, causes of these difficulties.

In this work no mention is made of the influence of such constitutional disorders as diabetes or locomotor-ataxia in the production of perforating ulcer of the foot. Mr. Walsham on the other hand has recognized this fact.

Gant considers pain and inability in fractures as functional symptoms of equivocal value in diagnosis and mentions ecchymosis only " as a more or less bruised discoloration of the integument, owing to extravasation of blood, especially in fractures from direct violence."

The repair of fractures brings out a decided difference of opinion. Thus Gant says: " Inflammatory lymph, in small quantity, is first exuded round about the seat of fracture, rendering the cellular texture more succulent and thus producing a swelling, which, however, is partly or principally due to the blood extravasated by the injury. After a period of inactivity, reparative or ossifying lymph begins to flow. A layer of this lymph is deposited between the fractured ends of bone, which undergoing development into fibro-cellular tissue, or perchance into cartilage, and thence in either case, into bone, restores the continuity of the fragments, forming an intermediately connecting layer of bone, an intermediate callus." This is the only callus, whether the ends be in apposition or overlap; although in the latter case the intermediate callus extends into the intervals of the displacement, so as to unite portions of bone which would otherwise be left unsupported. Neither an external nor an internal callus, therefore, is produced in the human subject, as was formerly supposed, excepting when the fractured limb or part is subjected to unusual motion during the process of repair or when the original bone is diseased. * * * The lymph deposited in either of these situations speedily ossifies, this change taking place in the external callus somewhat earlier than in the internal callus, and ossification proceeds gradually above and below toward the line of fracture. The walls of the fractured ends of bone remain still longer disunited. Either callus thus placed is formed some time before the intermediate lymph begins to ossify. As to the long mooted question respecting the source of the callus, in the repair of fracture, the adjoining bone is the principal source of the new bone, callus being an outgrowth, in fact, from it; *e.g.*, between the adjoining ends of a broken tibia."

Washam describes the process as follows: "The method of union is similar to that which occurs in the healing of a wound of the soft parts by the first intention. Blood is at first extravasated between and around the fragments. Then follows a simple traumatic inflammation; the periostum and the adjacent soft tissues, together with the medulla, become infiltrated with leucocytes, which have escaped from the vessels of the inflamed periosteum, medulla and bone, and by proliferating tissue cells derived from these parts. The inflammation subsides in a few days, leaving the fragments imbedded in a mass of soft, red, gelatinous material (granulation tissue) derived chiefly from the leucocytes and proliferated tissue cells, but according to some observers, in part, from the remains of the extravasated blood that has not been absorbed. This granulation tissue, which is called callus, consists here, as in the union of soft parts, of small round cells, with a small amount of firm intercellular substance and delicate loops of capillaries which are derived in part from the vessels in the Haversian canals and in part from the vessels in the periosteum and adjacent soft tissues. He also defines the callus as ensheathing internal and permanent, intermediate or definite callus.

Both authors unite in advocating the simple excision of the breast in cancerous disease, not removing the axillary fat with its chain of imbedded glands unless they are felt to be enlarged. This practice is different from that generally followed by the surgeons in this vicinity, and the results of the two methods are distinctly in favor of the complete extirpation of the affected mamma and its connected axillary fat and glands.

Operations upon the brain for tumor, abscess, etc., receives little attention from Mr. Gant. This department of cerebral surgery is summed up in about a page and a half. The greater part of this space is devoted to a summary of Mr. Lucas Championniere's cerebral localization. For methods of operating the reader is referred to the author's larger work on surgery. Still less consideration is devoted to this subject by Mr. Walsham.

The chapter devoted to diseases and injuries of the spine receives more careful treatment in the former than in the latter work, but in fractures of the spine he first advocates only such measures as will control inflammation and does not indicate the possibility of any cases being improved by operation. Mr. Walsham, on the other hand, recognizes the fact that lamnectomy may be beneficial when the symptoms point to compression rather than disorganization of the spinal cord.

In closing wounds of the intestines Mr. Gant advocates the Glover's continuous suture, but describes both Lembert's and Gely's. Mr. Walsham advocates the Lembert, and says the "continuous suture formerly advised should not be used, as, if one stitch gives way, the whole will become loose, the wound gape, and extravasation occur." In abdominal section the former advocates the surgeon's taking a position between the legs of the recumbent patient, and uses flannels wrung out of hot water to protect the intestine. It does not refer to enterectomy or intestinal anastomosis, but advises making an artificial anus.

While the latter author refers to enterectomy he has nothing to say on the other subject. Peritonitis, in the hands of Mr. Gant, is treated by topical blood-letting by means of leeches, warm fomentations and calomel and opium in pill form. Mr. Walsham advocates morphia and rest, but refers to the method of treatment by saline purgation advocated by Mr. Tait.

The former details and employs Mitchell Banks' method for the radical cure of hernia. The latter details, very briefly, Woods, Spanton and Banks' methods, but says so little about them that it is impossible to gain any practical information from the paragraph.

The operative surgery, *i. e.*, amputations, excisions, etc., are much better described in Mr. Gant's work, but the absence of an index is a serious drawback.

It cannot be said that the first work fulfills the purpose for which it was intended, *i. e.*, a safe surgical text-book for the student. Its antiquated ideas in pathology, absence of an index and incomplete discussion of many of the practical and advanced ideas, together with the omission of many of the new operations, and its constant reference to the author's "larger treatise," make it not only an inconvenient but a dangerous guide to any student coming up for examination before the Surgical Examining Boards of the present day.

The latter work, although leaving much to be desired in the way of description of operations and systematic arrangement, contains an index, is conservative in methods of treatment and fully up to the times. SAMUEL LLOYD.

SURGICAL BACTERIOLOGY. By N. SENN, M. D., Ph. D., Professor of Surgery in Rush Medical College, etc. Second edition. Thoroughly revised. 8vo. 265 pages. Illustrated. Philadelphia, Lea Brothers & Co. 1891.

"Within a few years bacteriology has revolutionized surgical pathology. All wound complications, and most of the acute and chronic inflammatory lesions which come under the care of the surgeon are caused by micro-organisms; hence the necessity of a proper recognition of the importance of bacteriology as an integral part of the science and practice of modern surgery." So writes the author in the preface to the first edition of this work; these words may be taken as the text from which the book was written.

Even within the year which elapsed between the publication of the first and the second editions so many new facts had been added to our knowledge of this branch of surgery that it was necessary to thoroughly revise the original volume and to add a number of illustrations, many of them colored plates, which form valuable supplements to the text.

The hereditary transmission of microbic disease is first discussed as regards the direct transmission, and also the transmission of an hereditary predisposition to certain diseases. The clinical evidences both for and against the direct infection of the fœtus through the placenta are set forth, and then the experimental proofs given. The results and conclusions of various authorities are quoted, and then the author's own conclusion that both forms of maternal influence exist. In a similar manner the questions of the existence of pathogenic micro-organisms in the healthy human body, the sources of bacterial infection, the localization of micro-organisms and the various processes by means of which bacteria, having once gained admission, are eliminated from the system, are considered at length. The only noteworthy omission in the consideration of localization is that of the probable identity of the bacteria of chorea, endocarditis and rheumatism to which reference is not made. An interesting chapter is devoted to the recent investigations of the antagonisms among micro-organism, especially those of erysipelas and diphtheria.

Having finished these general considerations, the author begins a more individual study of the various forms of bacteria. As introductory to these is a treatise on inflammation and suppuration, with descriptions and illustrations of the common pyogenic microbes. Then follows chapters devoted in succession to detailed accounts of the recognized germs of gangrene, septicæmia, pyæmia, erysipelas, erysipeloid, noma, tetanus, anthrax, glanders and gonorrhœa, giving in each case the characteristic appearance, action with various methods of staining, mode of culture, nutrient media preferred, and adding excellent illustrations of those bacteria of chief surgicial importance.

As would be expected, tuberculosis receives especial consideration, two long chapters being devoted to this subject. In speaking of the localization of this bacillus, Dr. Senn emphasizes Volkmann's conclusion—that "a severe trauma seldom, if ever, gives rise to tuberculosis at the seat of injury, but when tuberculosis is caused by an injury the trauma was always slight, sometimes almost insignificant." The clinical forms of tubercular infection, involving the skin, eye, ear, lymphatic glands, bones, joints, tendon sheaths, peritoneum, mouth and genital organs, are all considered, and interesting clinical illustrations are usually given under each sub-division.

Syphilis, though the specific micro-organism has not yet been isolated with certainty, is next discussed, the author believing that the disease is without doubt of bacterial origin.

Actinomycosis hominis, while not strictly due to a micro-organism, is included in the work, "as it often requires the aid of the microscope to make a differential diagnosis between this and other chronic infectious diseases characterized by the presence of granulation tissue."

The closing chapter is devoted to the alleged microbic origin of tumors, and as a result of his own researches the author concludes that "the microbic origin of malignant tumors has not only not been established but rendered improbable."

There is no claim made to originality in all of the subject matter; the book is really a systematic collection in the most concise form of such results as are published in current medical literature by the ablest workers in this field of surgical progress; and to these are added the author's own views and the results of his clinical experience and original investigations. The book is valuable to the student, but its chief value lies in the fact that such a compilation makes it possible for the busy practitioner, whose time for reading is limited and whose sources of information are often few, to become conversant with the most modern and advanced ideas in surgical pathology, which have "laid the foundation for the wonderful achievements of modern surgery."

H. P. DE FOREST.